

[0021] In the drawings:

[0022] **FIG. 1** shows the use of the display device in mobile telecommunication applications;

[0023] **FIG. 2** gives a diagrammatic section of the housing of the display device;

[0024] **FIG. 3** shows a bottom view of the display device;

[0025] **FIG. 4** shows a diagrammatic section of the display of the display device; and

[0026] **FIG. 5** shows the diagrammatic section of **FIG. 4** in a further variant.

[0027] The drawing Figures are not drawn to scale and only diagrammatic. Like reference numerals in different Figures refer to the same or like component parts. The Figures represent merely examples and are not determinative for the scope of protection.

[0028] **FIG. 1** shows the use of a display device according to the invention in a first application. In **FIG. 1a** the use in a mobile telephone **1** is shown. Such a mobile telephone **1** comprises a display **2** having dimensions of roughly 2 by 2 cm, whereas the mobile phone itself has a size of 4 by 10 cm. A display device having a display **3** is here accommodated in a housing **4, 5** and can be electrically connected to the mobile telephone **1** via interconnect pins **6**. The housing in this example comprises two different parts **4, 5**. The display is here present in part **5** in rolled-up form, whereas part **4** contains further driving electronics and batteries. **FIG. 1b** shows the mobile telephone **1** comprising the display device in which the display **3** is rolled up.

[0029] **FIG. 2** diagrammatically shows how a portion of the display **3** is accommodated in a first housing portion **5**. The housing portion **5** in this example contains a first and a second part **5a, 5b** which are interconnected by a hinge **51**. The housing portion **5** has a winding device **17** with which the display **3** can be rolled up. A spring **102** is present to provide a counterforce which engages the shaft **17** of the disk **100**. This disk has a slotted recess **101** with one or more hooks **27** over which the display **3** can be hooked. Supporting, foldable or hingeable arms **16** enhance the mechanical stability of the complete structure. The distance shown between the hingeable arms **16** and the display **3** is preferably of the order of several micrometers to several millimeters. It may happen that the arms **16** are not situated on the outside of the housing portions **4a, 5a** but inside them.

[0030] Furthermore, this example diagrammatically shows a locking means **19**. With this locking means **19** the housing portions **4** and **5** can be fixed to each other. A button **18** is present to release the locking means. The housing portion **4** comprises a printed circuit board **20** which accommodates a driving circuit **21** and electrical connections **22** to keys **18** and other control means. It also accommodates electrical connections **22** to a series of contact surfaces **38** which can contact contact surfaces **37**. The contact surfaces may be found on either one of the two sides of the display or only on one side. This housing portion may further comprise other integrated circuits, discrete semiconductor elements, batteries, antennas, speakers, cameras and the like. The antenna can provide a wireless connection between the appliance **1** and the display device **2** instead of the pin-shaped connection **25**. More particularly, the driving circuits **21** or further circuit elements can be used for implementa-

tion of a (standard) data transmission protocol, that is to say, how to use different displays (with the different numbers of lines and columns and rows etc.) in different types of appliances.

[0031] In this example the housing comprises two portions **4a, 4b** between which the display **3** can be clamped. In this way the conducting parts **6** can contact the contact surfaces (in this example two-sided contacting is shown). The contact surfaces are aligned by the guiding parts by means of aligning pins or recesses (in this case opening **24**) or a form of optical or mechanical feedback. Since the display preferably contains only several contact surfaces, they may be large and a rough alignment is sufficient.

[0032] Furthermore, the housing **4** can contain only one slot for the display **3** to be passed through. It should be observed in this context that the width of the display (that is to say, the distance perpendicular to the shaft on which it is rolled up) is not restricted by the dimensions of the slot. It is the size of the housing portion **5** that determines the maximum width of the display **3**, at any rate in this example. The display **3**, however, may not only be rollable but foldable in a direction perpendicular to the width (the direction of rolling out).

[0033] **FIG. 3** gives a diagrammatic bottom view of the display device **2** of which **FIG. 2** shows a sectional view. The display **3** and the foldable arm **16** are located between the first and second housing portions **4, 5** of the device. The arm here comprises four arm portions **161, 162, 163, 164**, but this is not essential. They are connected to each other via pivots **171, 172, 173, 174** at the hinging points of the arm **16**. In the arm **16**, which is hollow, runs a cable **30**. The cable is in this case a metal wire surrounded by insulating material. The cable **30** is suspended from a first and a second suspension point **33, 34** and has a first and a second elastic portion **31, 32** which are springs in this example. The first suspension point **33** has a variable position because it is located on a rotary disk **40**. The outside edge of the rotary disk **40** is therefore located partly outside the housing portion **5**.

[0034] Thanks to the springs **31, 32** the foldable arm **16** has a driving force for rolling out the display **3**. The cable **30** runs over the outside of the pivots **171, 172, 173, 174**. The length of the cable **30** along a pivot **171, 172, 173, 174** depends on the angle α between the arm portions. This length is $(180-\alpha/180)*\pi.r$, where r is the radius of the pivot. With a radius of 0.25 cm and three and a half pivots (as in this example) the difference in length between the first position and the maximum second position is thus 2.75 cm. The opposing force of the spring **27** can thus be set by the choice of the springs **31, 32**. If a larger difference is desired, the pivot **174** may be selected to be designed with a larger diameter.

[0035] It will be evident to the expert that **FIG. 3** shows only a possible embodiment. The foldable arm **16** may as well have fewer arm portions **161-164**. Furthermore, it may be that there is only a single housing in lieu of the two housing portions **4, 5**. It may also be that the spring **27** is entirely absent. In lieu of this the cable may be elastic to a desired extent. Also electromotors may be present. Albeit in principle one electromotor will suffice, it is to be preferred to utilize a plurality of electromotors, for example one in each of the housing portions, which are both connected with